

AMENDMENTS

In the Claims

This listing of claims will replace all prior versions, and listing, of claims in the application.

Claims 1-7 (Cancelled)

Claim 8 (Original): A method of isolating a population of rAAV particles, comprising the steps of: (a) chromatographing an AAV producer cell lysate containing rAAV particles on a positively-charged anion exchange resin; and (b) chromatographing an AAV producer cell lysate containing rAAV particles on a negatively-charged cation exchange resin, whereby a purified population of rAAV particles is generated.

Claim 9 (Original): The method of claim 8, wherein step a is performed before step b.

Claim 10 (Original): The method of claim 8, wherein step b is performed before step a.

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Claim 11 (Original): The method of claim 10, further comprising step (c) of chromatographing the lysate containing rAAV particles on a negatively-charged cation exchange resin, said step performed after steps (a) and (b).

Claim 12 (Original): The method of claim 11, wherein heparin sulfate is used for step (c).

Claim 13 (Original): The method of claim 8, further comprising the step of subjecting the producer cells to tangential flow filtration.

Claim 14 (Original): The method of claim 8, wherein the lysate is subjected to tangential flow filtration.

Claim 15 (Original): The method of claim 14, wherein tangential flow filtration is performed prior to chromatography.

Claim 16 (Original): The method of claim 14, wherein tangential flow filtration is performed after chromatography.

Claim 17 (Original): The method of claim 8, wherein said anion exchange resin is an N-charged amino or imino resin.

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Claim 18 (Original): The method of claim 17, wherein said anion exchange resin is selected from the group consisting of a POROS 50 PI resin, a diethylaminoethyl (DEAE) resin, a trimethylaminoethyl (TMAE) resin, a quaternary amine resin and a polyethylenimine (PEI) resin.

Claim 19 (Original): The method of claim 8, wherein said cation exchange resin is a sulfo-, phospho- or carboxy-based cationic resin.

Claim 20 (Original): The method of claim 19, wherein said cation exchange resin is selected from the group consisting of an HS resin, an SP resin, and a carboxymethyl (CM) resin.

Claim 21 (Original): The method of claim 8, wherein the producer cell is cultured under suspension conditions.

Claim 22 (Original): A method of isolating a population of rAAV particles, comprising the steps of: (a) chromatographing AAV producer cell culture supernatant which contains rAAV particles on a positively-charged anion exchange resin; and (b) chromatographing the AAV

producer cell culture supernatant containing rAAV particles on a negatively-charged cation exchange resin, whereby a purified population of rAAV particles is generated.

Claim 23 (Original): The method of claim 22, wherein step a is performed before step b.

Claim 24 (Original): The method of claim 22, wherein step b is performed before step a.

Claim 25 (Original): The method of claim 24, further comprising step (c) of chromatographing the lysate containing rAAV particles on a negatively-charged cation exchange resin, said step performed after steps (a) and (b).

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Claim 26 (Original): The method of claim 25 wherein heparin sulfate is used for step (c).

Claim 27 (Original): The method of claim 22, further comprising the step of subjecting the culture supernatant to tangential flow filtration.

Claim 28 (Original): The method of claim 27, wherein tangential flow filtration is performed prior to chromatography.

Claim 29 (Original): The method of claim 27, wherein tangential flow filtration is performed after chromatography.

Claim 30 (Original): The method of claim 22, wherein said anion exchange resin is an N-charged amino or imino resin.

Claim 31 (Original): The method of claim 20, wherein said anion exchange resin is selected from the group consisting of a POROS 50 PI resin, a diethylaminoethyl (DEAE) resin, a trimethylaminoethyl (TMAE) resin, a quaternary amine resin and a polyethylenimine (PEI) resin.

Claim 32 (Original): The method of claim 22, wherein said cation exchange resin is a sulfo-, phospho- or carboxy-based cationic resin.

Claim 33 (Original): The method of claim 32, wherein said cation exchange resin is selected from the group consisting of an HS resin, an SP resin, and a carboxymethyl (CM) resin.

Claim 34 (Original): The method of claim 22, wherein the producer cell is cultured under suspension conditions.

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Claims 35-49 (cancelled)

Claim 50 (Previously Amended): A method of generating a population of recombinant adeno-associated virus (rAAV) particles, comprising the steps of:

- a) incubating an AAV producer cell under conditions that are permissive for replication of AAV; said producer cell comprising: (i) one or more AAV packaging genes, wherein each said AAV packaging gene encodes an AAV replication or encapsidation protein; (ii) a recombinant AAV (rAAV) vector that comprises a heterologous non-AAV polynucleotide flanked by at least one AAV inverted terminal repeat (ITR); and (iii) a helper virus for AAV;
- b) lysing the producer cell after the incubation of step a) to produce an AAV producer cell lysate;
- c) chromatographing the AAV producer cell lysate of step b) on at least one positively-charged anion exchange resin; and
- d) purifying the chromatographic fractions containing rAAV particles of step c) by cation exchange chromatography or tangential flow filtration to generate a purified population of rAAV vector particles.

Claim 51 (Previously Amended): A method of generating a population of rAAV particles according to claim 50, wherein said purifying step d) comprises subjecting the fractions to cation exchange chromatography.

Claim 52 (Cancelled)

Claim 53 (Previously Amended): A method of generating a population of rAAV particles according to claim 50, wherein said rAAV vector comprises a heterologous non-AAV polynucleotide flanked by two AAV inverted terminal repeats (ITRs).

Claim 54 (Original): A method of generating a population of rAAV particles according to claim 50, wherein said AAV producer cell comprises at least one AAV packaging gene that is stably integrated into the genome of said AAV producer cell.

Claim 55 (Previously Amended): A method of generating a population of rAAV particles according to claim 50, wherein the helper virus is introduced into the producer cell already introduced with the AAV packaging gene(s) and the rAAV vector.

Claim 56 (Previously Amended): A method of generating a population of rAAV particles according to claim 50, wherein the rAAV vector and the helper virus are introduced simultaneously or sequentially into the producer cell already introduced with the AAV packaging gene(s).

Claim 57 (Previously Amended): A method of generating a population of rAAV particles according to claim 50, wherein the AAV packaging gene(s) and the rAAV vector are introduced simultaneously or sequentially into the producer cell already introduced with the helper virus.

Claim 58 (Original): A method of generating a population of rAAV particles according to claim 50, wherein said AAV producer cell comprises an AAV *rep* gene and an AAV *cap* gene.

Claim 59 (Original): A method of generating a population of rAAV particles according to claim 50, wherein said AAV *rep* gene and AAV *cap* gene are stably integrated into the genome of said AAV producer cell.

Claim 60 (Previously Amended): A method of generating a population of rAAV particles according to claim 50, wherein at least one AAV split-packaging gene is introduced into the producer cell.

Claim 61 (Original): A method of generating a population of rAAV particles according to claim 50, wherein said helper virus is an adenovirus.

Claim 62 (Original): A method of generating a population of rAAV particles according to claim 50, wherein said helper virus is a temperature-sensitive helper virus and said step of incubating the producer cell is conducted at a temperature that is permissive for replication of AAV but non-permissive for replication of the temperature-sensitive helper virus.

Claim 63 (Original): A method of generating a population of rAAV particles according to claim 50, wherein said helper virus is a temperature-sensitive adenovirus.

Claim 64 (Original): A method of generating a population of rAAV particles according to claim 50, wherein said helper virus is adenovirus Ad-ts149.

Claim 65 (Original): A method of generating a population of rAAV particles according to claim 50, wherein said AAV producer cell lysate is also affinity purified on a resin having a ligand that is specific for one or more surface molecules present on AAV.

Claim 66 (Original): A method of generating a population of rAAV particles according to claim 65, wherein the affinity purification is conducted after ion-exchange chromatography.

Claim 67 (Original): A method of generating a population of rAAV particles according to claim 65, wherein said ligand is an antibody that is specific for a surface molecule present on AAV.

Claim 68 (Previously Amended): A method of generating a population of rAAV particles according to claim 50, wherein the AAV producer cells of step a) are concentrated prior to lysis.

Claim 69 (Previously Amended): A method of generating a population of rAAV particles according to claim 68, wherein the AAV producer cells of step a) are concentrated by centrifugation or by tangential flow filtration prior to lysis.

Claim 70 (Original): A method of generating a population of rAAV particles according to claim 50, wherein said step of lysing the AAV producer cell is conducted by subjecting the cells to a lytic technique selected from the group consisting of microfluidization, sonication, and freeze-thawing.

Claim 71 (Original): A method of generating a population of rAAV particles according to claim 70, wherein said step of lysing the AAV producer cell is conducted by subjecting the cells to microfluidization.

Claim 72 (Previously Amended): A method of generating a population of rAAV particles according to claim 50, wherein the AAV producer cell lysate of step b) is treated with a nuclease prior to chromatography.

Claim 73 (Original): A method of generating a population of rAAV particles according to claim 72, wherein said nuclease is Benzonase.

Claim 74 (Previously Amended): A method of generating a population of rAAV particles according to claim 50, wherein the AAV producer cell lysate of step b) is clarified prior to chromatography.

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Claim 75 (Previously Amended): A method of generating a population of rAAV particles according to claim 74, wherein the AAV producer cell lysate of step b) is clarified by filtration or centrifugation prior to chromatography.

Claim 76 (Original): A method of generating a population of rAAV particles according to claim 50, wherein the AAV producer cells are concentrated prior to lysis, resuspended in a buffer comprising saline at an ionic strength at least that of a 50mM NaCl solution, lysed, and then clarified by filtration prior to chromatography.

Claim 77 (Original): A method of generating a population of rAAV particles according to claim 51, wherein chromatographic fractions containing rAAV particles are concentrated by filtration or centrifugation after elution from the chromatographic resin.

Claim 78 (Original): A method of generating a population of rAAV particles according to claim 51, wherein chromatographic fractions containing rAAV particles are concentrated by tangential flow filtration

Claim 79 (Original): A method of generating a population of rAAV particles according to claim 50, wherein said anion exchange resin is an N-charged amino or imino resin.

Claim 80 (Original): A method of generating a population of rAAV particles according to claim 50, wherein said anion exchange resin is selected from the group consisting of a POROS 50 PI resin, a diethylaminoethyl (DEAE) resin, a trimethylaminoethyl (TMAE) resin, a quaternary amine resin and a polyethylenimine (PEI) resin.

Claim 81 (Original): A method of generating a population of rAAV particles according to claim 51, wherein said cation exchange resin is a sulfo-, phospho- or carboxy-based cationic resin.

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Claim 82 (Previously Amended): A method of generating a population of rAAV particles according to claim 51, wherein said cation exchange resin is selected from the group consisting of a heparin sulfate (HS) resin, a sulfopropyl (SP) resin, and a carboxymethyl (CM) resin.

Claim 83 (Original): A method of generating a population of rAAV particles according to claim 50, wherein the producer cell of step a) is an attachment-dependent mammalian cell line.

Claim 84 (Previously Amended): A method of generating a population of rAAV particles according to claim 50, wherein said step a) of incubating the producer cell is conducted in a vessel selected from the group consisting of a tissue culture flask, a roller bottle, a spinner flask, a tank reactor, a fermentor, and a bioreactor.

Claim 85 (Previously Amended): A method of generating a population of rAAV particles according to claim 50, wherein said step a) of incubating the producer cell is conducted using a microcarrier.

Claim 86 (Previously Amended): A method of generating a population of rAAV particles according to claim 84, wherein said bioreactor is a hollow-fiber, packed-bed or fluidized-bed bioreactor.

Claim 87 (Original): A method of generating a population of rAAV particles according to claim 50, wherein the producer cell of step a) is a suspension-adapted mammalian cell line.

Claim 88 (Previously Amended): A method of generating a population of rAAV particles according to claim 50, wherein said step a) of incubating the producer cell is conducted in a vessel selected from the group consisting of a spinner flask, a tank reactor and an air lift fermentor.

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Claim 89 (Previously Amended): A method of generating a population of rAAV particles according to claim 50, wherein said step a) of incubating the producer cell is performed in rAAV medium essentially as shown in Table 2.

Claim 90 (Original): A method of generating a population of rAAV particles according to claim 50, wherein the producer cells are 293 N3s cells or HeLa S3 cells.

Claim 91 (Previously Amended): A method of generating a population of rAAV particles according to claim 50, wherein step a) is conducted for at least 5 days.

Claim 92 (Previously Amended): A method of generating a population of rAAV particles according to claim 50, wherein step a) of incubating the producer cell is conducted in a multi-liter bioreactor and wherein at least about 10^9 replicative units of rAAV per liter of bioreactor volume are isolated after step d).

Claims 93-117 (Cancelled)

Claim 118 (Previously Amended): A method of generating a population of recombinant adeno-associated virus (rAAV) particles, comprising the steps of:

a) incubating an AAV producer cell under conditions that are permissive for replication of AAV and which comprise inducing a sub-lethal stress in the AAV producer cell; wherein said AAV producer cell comprising (i) one or more AAV packaging genes, wherein each said AAV packaging gene encodes an AAV replication or encapsidation protein; (ii) a recombinant AAV (rAAV) vector that comprises a heterologous non-AAV polynucleotide flanked by at least one AAV inverted terminal repeat (ITR); and (iii) a helper virus for AAV;

b) lysing the producer cell after the incubation of step a) to produce an AAV producer cell lysate; and

c) purifying the AAV producer cell lysate to generate a population of recombinant adeno-associated virus (rAAV) particles, wherein said purifying step comprises chromatographing the AAV producer cell lysate of step b) on at least one positively-charged anion exchange resin followed by purifying on either a cation exchange resin or by tangential flow filtration to generate a purified population of rAAV vector particles.

Claim 119 (Previously Amended): The method of claim 118, wherein said purifying step c) comprises chromatographing the AAV producer cell lysate of step b) on at least one negatively-charged cation exchange resin followed by purifying on an anion exchange resin.

Claims 120-158 (Cancelled)

Claim 159 (Previously Amended): A method of generating a population of recombinant adeno-associated virus (rAAV) particles, comprising the steps of:

a) incubating a producer cell in a cell culture medium under conditions comprising a condition that promotes release of rAAV particles, whereby rAAV particles are released from the producer cell into the culture medium, wherein the producer cell comprises:

- (i) one or more AAV packaging genes, wherein each said AAV packaging gene encodes an AAV replication or encapsidation protein;
- (ii) a recombinant AAV (rAAV) vector that comprises a heterologous non-AAV polynucleotide flanked by at least one AAV inverted terminal repeat (ITR);
- and
- (iii) helper virus function for AAV;
- (b) harvesting the rAAV particles from the cell culture medium, thereby obtaining a population of rAAV particles; and
- c) chromatographing the rAAV producer cell culture medium on a positively-charged anion exchange resin; and
- d) purifying the chromatographic fractions containing rAAV particles of step c) by cation exchange chromatography or tangential flow filtration to generate a purified population of rAAV vector particles.

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Claim 160 (Original): The method of claim 159, wherein step (d) is cation exchange chromatography.

Claim 161 (Currently Amended): A method of generating a population of recombinant adeno-associated virus (rAAV) particles, [The method of claim 158, further] comprising the steps of:

a) incubating a producer cell in a cell culture medium under conditions comprising a condition that promotes release of rAAV particles, whereby rAAV particles are released from the producer cell into the culture medium, wherein the producer cell comprises:

(i) one or more AAV packaging genes, wherein each said AAV packaging gene encodes an AAV replication or encapsidation protein;

(ii) a recombinant AAV (rAAV) vector that comprises a heterologous non-AAV polynucleotide flanked by at least one AAV inverted terminal repeat (ITR);
and

(iii) helper virus function for AAV;

(b) harvesting the rAAV particles from the cell culture medium, thereby obtaining a population of rAAV particles;

c) chromatographing the AAV producer cell culture medium on a negatively-charged cation exchange resin;

d) purifying the chromatographic fractions containing rAAV particles of step c) by anion exchange chromatography; and

e) purifying the chromatographic fractions containing rAAV particles of step d) by cation exchange chromatography to generate a purified population of rAAV vector particles.

Claim 162 (Original): The method of claim 161, wherein the chromatography of step e) is performed using heparin sulfate.

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Claims 163-177 (Cancelled)

Claim 178 (New): A method of generating a population of rAAV particles according to claim 50, wherein said purifying step d) comprises subjecting the fractions to tangential flow filtration.

Claim 179 (New): A method of generating a population of rAAV particles according to claim 178, wherein the tangential flow filtration is performed with diafiltration using a solution comprising 5% glycerol.


Claim 180 (New): The method of claim 118, wherein said purifying step c) comprises chromatographing the AAV producer cell lysate of step b) on at least one positively -charged anion exchange resin followed by purifying on a cation exchange resin.

Claim 181 (New): The method of claim 118, wherein said purifying step c) comprises chromatographing the AAV producer cell lysate of step b) on at least one positively -charged anion exchange resin followed by purifying on a tangential flow filtration.

Claim 182 (New): The method of claim 181, wherein the tangential flow filtration is performed with diafiltration using a solution comprising 5% glycerol.

Claim 183 (New): The method of claim 159, wherein step d) is tangential flow filtration.

Claim 184 (New): The method of claim 183, wherein the tangential flow filtration is performed with diafiltration using a solution comprising 5% glycerol.

 Claim 185 (New): A method of isolating rAAV particles comprising the steps of:
(a) chromatographing an AAV producer cell lysate containing the rAAV particles on a positively charged anion exchange resin; and
(b) purifying the chromatographic fractions containing the rAAV particles of step a) by tangential flow filtration to generate a purified population of the rAAV particles.

Claim 186 (New): The method of claim 185, wherein said anion exchange resin is an N-charged amino or imino resin.

Claim 187 (New): The method of claim 185, wherein said anion exchange resin is selected from the group consisting of a POROS 50 PI resin, a diethylaminoethyl (DEAE) resin, a trimethylaminoethyl (TMAE) resin, a quaternary amine resin and a polyethylenimine (PEI) resin.

Claim 188 (New): The method of claim 185, wherein the producer cell is cultured under suspension conditions.

Claim 189 (New): The method of claim 185, wherein the tangential flow filtration is performed with diafiltration using a solution comprising 5% glycerol.

Claim 190 (New): A method of isolating rAAV particles comprising the steps of:
(a) chromatographing an AAV producer cell culture supernatant which contains the rAAV particles on a positively charged anion exchange resin; and
(b) purifying the chromatographic fractions containing the rAAV particles of step a) by tangential flow filtration to generate a purified population of the rAAV particles.

Claim 191 (New): The method of claim 190, wherein said anion exchange resin is an N-charged amino or imino resin.

Claim 192 (New): The method of claim 190, wherein said anion exchange resin is selected from the group consisting of a POROS 50 PI resin, a diethylaminoethyl (DEAE) resin, a trimethylaminoethyl (TMAE) resin, a quaternary amine resin and a polyethylenimine (PEI) resin.

Claim 193 (New): The method of claim 190, wherein the producer cell is cultured under suspension conditions.

Claim 194 (New): The method of claim 190, wherein the tangential flow filtration is performed with diafiltration using a solution comprising 5% glycerol.